

HOUSE-SCALE TRIAL OF FENFLUTHRIN (OMS-2013) AGAINST DDT RESISTANT *ANOPHELES ACONITUS* IN CENTRAL JAVA

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ABSTRAK

Pengujian racun serangga fenfluthrin 5% w.d.p. dengan dosis 20 mg/m² tingkat perumahan telah dilakukan untuk menanggulangi vektor malaria *Anopheles aconitus* yang sudah kebal terhadap DDT di desa Sekolo, Kecamatan Boja, Jawa Tengah. Penilaian entomologi dikerjakan dengan cara pengujian hayati kontak langsung, kontak tidak langsung dan penangkapan *An. aconitus* yang istirahat di dalam kandang pagi hari.

Hasil pengujian hayati kontak langsung menunjukkan bahwa umur residu fenfluthrin yang disemprotkan pada permukaan dinding dengan dosis 20 mg/m² adalah tidak lama (hanya sekitar 1 bulan). Umur residu yang efektif (kematian >70%) hanya dipermukaan bambu pada 4 hari setelah penyemprotan. Pengaruh fumigasi racun serangga ini sangat lemah, kematian hanya sebesar 14% dalam pengujian hayati kontak tidak langsung pada 4 hari setelah penyemprotan.

INTRODUCTION

To meet the challenge resistance of malaria vectors to DDT in Central Java, alternative insecticides are being evaluated.

Fenfluthrin (OMS-2013), a new compound of synthetic pyrethroid, was field tested in Stage IV trial in Indonesia. In laboratory tests, this compound was reported to have knock down action against dipterans, particularly mosquitoes, and it was also shown that fenfluthrin had residual effect when applied as a 5% w.d.p. at a dose of 10 mg a.i./m² against *Aedes aegypti* (1).

This paper presents the results obtained during a house-scale trial, designed primarily to determine residual life of this compound under field conditions.

MATERIAL AND METHOD

Trial area.

The trial area, Sekolo, a hamlet located 10 km west of Ungaran, Central Java, at an elevation of 320 m and surrounded by terraced rice fields, having 82 houses with 397 populations and 21 cattle shelters was selected. The houses are large and constructed of wood beams, wood or woven bamboo walls, mud floors and tiled roofs (but occasionally thatch). If the house holders own buffaloes or cows they are usually kept at night in an enclosed shelter within or attach on the house. The last spraying in this area was done at the end of August 1981 with organochlorin compound (OMS-1558) 70% wdp. at dosage 2 gr/m².

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Insecticide applications.

The synthetic pyrethroid compound fenfluthrin 5% wdp. was applied to two houses which have cattle shelters inside at a target dosage 20 mg/m². The houses and cattle shelters were sprayed inside to a height of 3 m, including the underside of furniture, shelves and other horizontal surface. Outside walls were sprayed to the same height when protected by roof overhanging 1 m or more, and eaves were sprayed from outside to height of 3 m.

The spraying was conducted on 21 May 1984 by experienced spraymen, under close supervision, using Hudson x—pert^R compression sprayers fitted with pressure gauges and Teejet^R 8002 HSSE nozzle tips having discharge of 750 ml/min at 40 psi. The spraymen wore overalls uniform, semi hard hat, surgical masks and ankle length canvas shoes. Hands and face were washed with soap and water after each pump charge.

Entomological evaluations

Weekly evaluations were conducted in the morning and consisted of the following :

1. Bioassay tests.

Bioassay tests were conducted according standard WHO methods (2), using laboratory reared blood fed *An. aconitus*

a. Contact bioassay.

Contact bioassay was carried out on wood and bamboo surface, 5 cones with 10—15 mosquitoes per cone in each sprayed surface exposed for 30 minutes and 2 cones in each unsprayed surface for the check.

b. Air bioassay.

In air bioassay test, two cages

(12 cm³) with 20 — 25 mosquitoes per cage were hung for 4 hours in corners of rooms of houses sprayed 50 cm from the ceiling and walls. Similarly in control two cages were placed in one unsprayed house.

Mortality counts were made after 24 hours for both types of bioassays. All bioassay results are presented as percent mortalities in individual tests.

2. Mosquito collections.

Hand catches of anophelines resting in treated and untreated cattle shelters were made 15 minutes for each hour from 07.00 — 09.00 and all blood fed *An. aconitus* held for 24 hours before mortality was assessed.

RESULT

Insecticide applications

There were no mixing or suspensibility problems with the insectide, no toxicological problem to the spraymen, occupants of the house or domestic animals. The formulation of this compound has less odour compared with organophosphate compound.

Entomological evaluations.

Result of bioassay tests are presented in Table 1. Mortalities of 50% or more were observed in contact bioassay tests only for four days after spraying in wood surfaces and for 11 days on bamboo surfaces. The mortality rates were reduced afterwards and in the last observation (25 days after spraying) only 16,2% mortality on wood surfaces and 10,6% on bamboo surfaces was found. The airborne effect of fenfluthrin was 14% mortality and lasted for four days only after spraying.

Table 1. Percent mortalities of *An. aconitus* in bioassay tests of houses treated with 20 mg/m² fenfluthrin 5% w.d.p.

Days after spraying	Contact bioassay ¹ /				Air bioassay ¹ /	
	Surface treated		Check		Houses treated	Check
	Wood	Bamboo	Wood	Bamboo		
4	52 (75)	74,6(75)	0 (30)	0(30)	14(50)	0(50)
11	41,3(75)	50,0(66)	0 (30)	0(30)	6(50)	2(50)
18	16,4(67)	20,0(65)	0 (27)	0(30)	0(50)	0(50)
25	16,2(74)	10,6(75)	3,3(30)	0(30)	Discontinued	

1/ Number of mosquitoes tested in parenthesis.

Table 2. Number and % mortalities of *An. aconitus* collected in cattle shelters treated with fenfluthrin 5% w.d.p. dosage 20 mg/m² and in unsprayed cattle shelter.

Days after spraying	Treated No. collected	Mortality	Check No. collected	Mortality
4	0	0	13	0
11	5	0	13	0
18	0	0	10	0
25	4	0	13	0

The result of anophelines collections showed that blood fed *An. aconitus* appeared about 25 days after spraying in treated cattle shelters, while in unsprayed cattle shelter they were found in every collection. No mortality of blood fed *An. aconitus* was found after holding for 24 hours 25 days after spraying.

DISCUSSION AND CONCLUSION

The result of this trial showed that fenfluthrin, applied at a 20 mg/m² dosage has no long residual life and airborne effect was negligible. The residual effect (70% mortalities) was only for one week or less. The results indicate that this compound does not appear to be pro-

missing for further trials (village-scale trials).

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